DOCUMENT RESUME

ED 325 446 SP 032 662

AUTHOR Bird, Tom
TITLE A Pragmatic Study of Schoolteaching.
PUB DATE Apr 90
NOTE 52p.; Paper presented at the Annual Meeting of the American Based on Ph.D. Dissertation, Stanford University.
PUB TYPE Speeches/Conference Papers (150) -- Reports - Descriptive (141)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Biology; *Classroom Environment; *Classroom Techniques; *Instructional Design; Pragmatics; *Research Methodology; *Research Problems; Science Instruction; Secondary Education; Teacher Responsibility; Teacher Student Relationship; *Theory Practice Relationship

ABSTRACT

A study was undertaken to derive, demonstrate, and appraise a form for pragmatic studies of schoolteaching--a form defined as eclectic deliberation on a practical problem in schoolteaching. The exploration of the pragmatic form addressed the problem of beginning the year in the introductory biology courses of a high school. The analysis framed the schoolteacher's task as a fourfold problem involving: (1) the teacher's responsibility; (2) the subject matter regarded as a set of valuables to be placed in reach of students; (3) the students regarded as experienced actors in the class; and (4) the class regarded as an organization with properties of its own. Within that framework, eight arguments from educational theory and research were employed to interpret the teaching problem. The analysis was completed with a deliberation, conducted in terms of the assembled arguments, on the relative merits of two procedures for starting the year. This paper, which describes the study, draws on precedents for considering educational design as a form of educational inquiry, outlines the analysis of the problem of beginning the year in introductory biology, and concludes with an appraisal of the form of inquiry. A list of 68 references is included. (Author/JD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED325446

A Pragmatic Study of Schoolteaching

Tom Bird

Michigan State University

PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

T. Bird

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC).

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Paper presented at the Annual Meeting of the American Educational Research Association.

Boston, Massachusetts, April 16-20, 1990

Running Head: PRAGMATIC STUDY

SP 032 602

Abstract

Following suggestions provided by John Dewey, Richard Rorty, Joseph Schwab, and Gary Fenstermacher, I attempted to derive, demonstrate, and appraise a form for pragmatic studies of schoolteaching; that form is eclectic deliberation on a practical problem in schoolteaching. In effect, I treated educational design as a mode of inquiry that may complement abstractive educational studies. This exploration of the pragmatic form addressed the problem of beginning the year in the introductory biology courses of a high school. To organize an eclectic interpretation that made balanced use of relevant arguments provided by educational theory and research, the analysis framed the schoolteacher's task as a fourfold problem involving the teacher's responsibility, the subject matter regarded as a set of valuables to be placed in reach of students, the students regarded as experienced actors in the class, and the class regarded as an organization with properties and effects of its own. Within that fourfold framework, I employed eight arguments from educational theory and research serially to interpret the teaching problem. I completed the analysis with a deliberation, conducted in terms of the assembled arguments, on the relative merits of two programs for starting the year. The aims of the analysis were to achieve a complex understanding, particular to the schoolteaching problem, that would complement and organize specialized studies; to avoid hazards associated with overworking abstractions in isolation both from each other and from the practical problems to which they all refer; and to integrate schoolteaching's moral, intellectual, and social features. This paper describes the project, which was a dissertation. The paper draws on precedents for considering educational design as a form of educational inquiry, outlines the analysis of the problem of beginning the year in introductory biology, and concludes with an appraisal of the form of inquiry.

A Pragmatic Study of Schoolteaching

Theory and Practice: Whose Problem?

The relations of academic knowledge to schoolteachers' thought and actions remain interesting. Shelves of reform proposals are accumulating; many or most them claim justification in educational theory and research. They convey confidence that the knowledge to teach school better exists, if only it can be brought to bear on the practice. It would seem that theorists, researchers, policy-makers, teacher educators, and program designers know better than schoolteachers do.

Informed commentators are not, however, equally sanguine about the pragmatic value of educational theory and research. For example, the Holmes Group's ambitious account of the promise of contemporary research for schoolteaching received the sharp retort that "Nothing I know of within the literature of research on teaching comes even close to justifying the epistemological claims the report sets forth (Jackson, 1987, p. 386). Phillip Jackson urged us to "face our ignorance" and to "search within teaching itself for a conception of what the profession might become" (p. 388).

I wish neither to suggest that the recent research on schoolteaching has been inept or uninteresting nor to ask whether educational research and theory satisfy the canons and conventions of the disciplinary communities that produced them. I do want to explore the question of pragmatic value. That is, what, or how, do educational research and theory contribute to wise choices among alternative courses of action in concrete situations of schoolteaching? Do they help us, or how do they help us, to achieve "working harmony among our diverse desires" in particular instances of education (Dewey in Rorty, 1982)? I want to raise the problem of theory and practice as a problem not for practitioners but for theorists and researchers, and as a problem not of implementation or teacher education, but as a problem of methods for inquiry.

The Disintegration of Practice

In The Quest for Certainty, John Dewey posed the relation of theory and practice in a fashion that called as much attention to problems of theory and research as to problems of practice. He began by affirming the value of abstractive work:

> Abstraction is simply an instance of the economy and efficiency involved in all intelligent practice:--deal first with matters that can be effectively handled, and then use the results to go on to cope with more complex affairs. (Dewey, 1929/1988, p. 173.)

Both moral and empirical theories and a variety of research results might qualify as effective handling of the simpler affairs of schoolteaching. Such abstractions--arguments--may provide means for interpretation, prediction, judgement, and influence, and so help us to cope with schoolteaching's complexer affairs.

However, while he granted the potential or probable value of abstractions, Dewey also pointed to an occupational hazard of abstractive work. The "quest for certainty" in the form of a spectator's specialized knowledge, he argued, tends to foster misunderstanding. From the paragraph quoted above, he went on to say:

> Objection comes in, and comes in with warranted force, when the results of the abstractive operations are given a standing which belongs only to the total situation from which they have been selected. All specialization breeds a familiarity which tends to create an illusion. Material dealt with by specialized abstractive processes comes to have a psychological independence and completion which is converted--hypostatized--into objective independence and self-sufficiency. (Dewey, 1929/1988, pp. 173-174)

Deep involvement with abstractions of schoolteaching may lead us to accord them a psychological independence from schoolteaching that they do not deserve, to substitute those abstractions for the experienced and enacted practice, and so to misunderstand it. In the very pursuit of assured knowledge, we run a risk of overstating the wisdom and weight that would be accorded to our arguments when they are considered in light both of a concrete problem of the practice and in relation to the variety of other arguments that apply to it.

There is a remedy for this problem; Dewey concludes the passage as follows:

> But in practice, there is always an accompanying reverse movement. These generalized findings are employed to enrich the meanings of individualized experiences, and to afford, within limits of probability, an increased control of them. It is in this sense that all reflective knowledge as such is instrumental. The beginning and the end are things of gross everyday experience. (Dewey, 1929/1988, p. 174, emphasis added.)

Clearly, this last paragraph expresses the aspiration that research and theory should and can be applied to practice: abstractions may discipline actions. However, when the paragraph is read in the context of the two that go before, it also appears that the "reverse movement" to practice serves to correct or contain abstractive misunderstanding--"illusion." In Dewey's pragmatic philosophy, action also disciplines abstraction; "the beginning and the end are things of gross everyday experience."

The Submergence of the Moral.

Empirical abstractions were not Dewey's sole concern. He also argued that the quest for certainty in the form of a spectator's knowledge tends to divorce material questions from questions of good and right--and to denigrate the latter.

> There has been repeated occasion to note that the claim of physical objects, the objects in which the physical sciences terminate, to constitute the real nature of the world, places the objects of value with which our affections and choices are concerned at an invidious disadvantage. . . . The net practical effect is the creation of the belief that science exists only in the things which are most remote from any significant human concern, so that as we approach social and moral questions and interests we must either surrender hope of the guidance of genuine knowledge or else purchase a scientific title and authority at the expense of all that is distinctly human. . . . The problem of restoring integration and cooperation between man's beliefs about the world in which he lives and his beliefs about the values and purposes that should direct his conduct is the deepest problem of modern life. (Dewey, 1929, pp.156, 204)

Arguing in a similar vein, Richard Rorty (1982) described an amoral tendency in the social sciences. Some social scientists have supposed, he says, that a discipline's vocabulary can made scientific by striking any terms that carry moral significance. He regarded that tendency to be a consequence of the representational idea of knowledge (Dewey's "spectator theory of knowledge") and he argued that it was mistaken.

> These intertwined mistakes--the notion that a term is more likely to "refer to the real" if it is morally insignificant and if it occurs in true, predictively useful generalizations--give substance to the idea of "scientific method" as . . . the search for an absolute conception of reality. (Rorty, 1982, p. 194)

Objectivity, it was supposed, would be achieved by dismissing moral concerns and terms from the discourse in social studies. But that effort, Rorty proposes, was futile.

> [I]t has become obvious that <u>whatever</u> terms are used to describe human beings <u>become</u> "evaluative" terms. The suggestion that we segregate the "evaluative" terms in a language and use their absence as one criterion for the "scientific" character of a discipline or a theory cannot be carried out. For there is no way to prevent anybody using <u>any</u> term "evaluatively." (Rorty, 1982, p. 195, emphasis in original)

Having rejected both the reasonability and the feasibility of a social science free from considerations of value, Rorty takes up a pragmatic position regarding its language:

> Vocabularies are useful or useless, good or bad, helpful or misleading, sensitive or coarse, and so on; but they are not 'more objective' or 'less objective' nor more or less 'scientific'. (Rorty, 1982, p. 203)

Indeed, he rejects even the desirability of value-free language for social science. Instead, he argues that there are two requirements for the vocabulary of the social sciences. First, it should contain "descriptions of situations which facilitate their prediction and control." Second, it should contain "descriptions which help one decide what to do." (Rorty, 1982, p. 197) To use Dewey's terms, the language of social science should help us to reconcile our beliefs about the world with our beliefs about the values and purposes that should direct our conduct.

Like Dewey, Rorty seeks that reconciliation in the "reverse movement" to practice.

> For the pragmatists, the pattern of all inquiry--scientific as well as moral--is deliberation concerning the relative attractions of various concrete alternatives. (Rorty, 1982, p. 164)

In regard to educational inquiry, Rorty was suggesting a path already travelled by Joseph Schwab.

<u>Joseph Schwab and "The Practical"</u>

Twenty years ago, Joseph Schwab renewed Dewey's argument by claiming that the educational field called "curriculum" was unable "to continue its work and contribute significantly to the advancement of education." It had reached that "unhappy state by inveterate, unexamined, and mistaken reliance on <u>theory</u>" (Schwab, 1978a, 287-288, emphasis in original). That statement

was not an attack on theory as such; elsewhere, Schwab referred to the social sciences as providing our "fullest and most reliable knowledge" about various aspects of education (Schwab, 1978b).

Rather, he was insisting that practical affairs also have an integrity all their own.

> The problems of education arise from exceedingly complex actions, reactions, and transactions of men. These doings constitute a skein of myriad threads which know no boundaries separating, say, economics from politics, or sociology from psychology. (Schwab, 1978b, pp. 329-330)

He described how abstractive work disintegrates practices and practical situations.

> In the course of . . . readying a subject of scientific, or theoretic, inquiry, the principles which distinguish it from the whole tend to confer on the partial subject an appearance of wholeness and unity. The connecting and entwining threads which originally made it one aspect of a larger whole are smoothed down and covered over. . . . The bodies of knowledge are themselves separated, each couched in its own set of terms. Only a few terms of each set have connections with terms of another set. Hence, the bodies of knowledge that we inherit from the behavioral sciences are, taken separately, only imperfectly applicable to practical problems, problems which arise in the whole web of the original complexity. (Schwab, 1978b, p. 330)

In other words, there is something to understand in those "connecting and entwining threads" that compose the whole web. When we decompose that web, smoothing down and covering over the interconnecting threads--as we necessarily must in many kinds of studies--we tend to pay a price of misunderstanding that comes from taking a practical object apart and taking it out of its context.

Like Dewey, Schwab recognized that educational "values and purposes" are an integral part of that "original complexity." He made the point in a contrast between the theoretical and the practical.

> The problems of the theoretic arise from areas of the subject matter marked out by what we already know as areas which we do not yet know. . . . Practical problems . . . arise from states of affairs in relation to ourselves. . . . They are constituted of conditions which we <u>wish</u> were otherwise and we think they <u>can be made</u> to be otherwise. (Schwab, 1978a, p. 289).

<u>Implementing the "Reverse Movement"</u>

Schwab proposed means by which, in Dewey's terms, "generalized findings are employed to enrich the meanings of individualized experiences, and to afford, within limits of probability, an increased control of them." He aimed to do that with some care for the partiality and limitations of

the generalized arguments that are employed. He proposed two forms of work that might serve to overcome the disintegration of practice. One form he called "eclectic arts."

> The eclectic arts are arts by which we ready theory for practical use. They are arts by which we discover and take practical account of the distortions and limited perspective which a theory imposes on its subject (Schwab, 1978b, p. 323).

Eclectic arts are intended specifically to overcome the tendency to overwork a given abstraction to the point that it assumes an unwarranted psychological independence from the matters to which it refers. They do so by comparing and relating diverse theories that may be relevant to some educational problem, with the aim of using those theories together to understand practical matters. Notably, that enterprise affords as much opportunity to discover problems and limitations in the theories as to apply the theories to the problem.

The other form of work Schwab called "practical" and "quasi-practical deliberations" on problems of educational practice. In such deliberations, a variety of arguments and information are brought to bear together to interpret the problems, to propose means for dealing with them, and to choose among those means. He pictured those deliberations as a seminar comprising persons with diverse interests and vocabularies, who would tackle an educational problem together. The diversity of arguments and vocabularies offered at the table would both constrain each other and remedy each other's partiality.

Schwab attached considerable importance to the distinction between practical deliberations and "quasi-practical" ones; the issue is one of understanding. In Schwab's nomenclature, practical deliberations address a particular concrete problem in a place and time; if those deliberations make thorough and careful use both of relevant abstractions and of information about the local situation, they might achieve considerable authority or assurance about their interpretation of the problem and about the course of action that should be taken. That is, the deliberators could advance a strong claim to <u>understand</u> the problem.

Quasi-practical deliberations address a collection of practical problems that are argued to be sufficiently similar as to constitute a class, but that must be acknowledged to be materially different from each other. Even if the deliberators make careful use of abstractions, they must always acknowledge that differences among situations in that class will limit the authority of their conclusions. That is, their claim to understanding must be more limited, and their proposals must be offered with greater restraint, caution, and qualification.

In sum, Schwab was proposing eclectic deliberations on problems of practice both as a mode of action and as a mode of understanding, or inquiry. My project here is to pursue the latter suggestion, and to work out a form, or genre, in which that pragmatic mode of inquiry may be conducted.

Educational Design as Educational Inquiry

One familiar instance of eclectic "deliberation concerning the relative attractions of various concrete alternatives" is educational design. Design tends to be oriented to "current practical concerns." Those concerns include schoolteaching problems such as planning and teaching a unit on "The Cell" or on Charles Darwin's life and thought, conducting relations with students' parents over the course of the year, or starting introductory biology classes--getting them underway in several senses--at the beginning of the school year.

Like other modes of inquiry that grew from craft and folk concerns and practices, design-as-inquiry aims to refine the everyday business of negotiating and deciding what to teach, why, and how, under the circumstances. Regarded as a form of inquiry, design might be compared to history, in that it seeks understanding not in analytic universals, but in objects that are bound in time and place.

In educational design, the method for exploring the problem is the pragmatic one: deliberation on the relative merits of concrete alternatives. Since those merits should be argued in some informed and principled way, the inquiry incorporates an eclectic interpretation of the

problem at hand. Several different arguments from pertinent theory and research are brought to bear on various aspects of the practical problem. While the eventual result may be useable designs, the immediate purpose is to discover whether those arguments will enable the analyst to speak reasonably and usefully about the schoolteaching problem.

Through the attempt to construct and compare eclectic designs for dealing with a schoolteaching problem, the designer-inquirer aims to understand the problem better, that is, in a fuller, more complex, and more particular way than is provided by any of the abstract and partial views that he incorporates in the analysis. At the same time, the designer has the opportunity to discover the pragmatic value of the abstract arguments that are employed in the analysis. That is, what does each argument contribute to achieving a working harmony among our diverse educational desires as they appear in the problem at hand?

A Blurred Genre

Today, Schwab's "practical essays" might be understood as a proposal for a "blurred genre" (Geertz, 1981) that combines forms of decisionmaking and inquiry. In the face of reasonable skepticism about any such hybrid, the proposal could draw methodological permission, if not support, from the contemporary flux, variety, and interpenetration of perspectives and methods in the social sciences. Clifford Geertz summarized the situation:

> So far as the social sciences are concerned, [the blurring of genres] means that their oft-lamented lack of character no longer sets them apart . . . . [F]reed from having to become taxonomically upstanding, because nobody else is, individuals thinking of themselves as social (or behavioral or human or cultural) scientists have become free to shape their work in terms of its necessities rather than according to received ideas as to what they ought or ought not to be doing. (Geertz, 1981, p. 21)

By "free to shape their work in terms of its necessities", Geertz means that they are free to compose the objects of their inquiry as seems most fruitful, to develop methods of investigation suited to those objects, and to shape their ways of writing and talking to suit the kind of understanding they seek. He is referring specifically to the tendency in the social sciences toward

interpretative as distinct from law-seeking aspirations--a trend that appears also in the research on schoolteaching (Shulman, 1986).

Richard Rorty's (1982) pragmatic discussion of method and genre in the social sciences provides not only permission but also support for inquiry that spans recognized disciplinary boundaries to address practical problems. Rorty argues that we should not be concerned with establishing clear boundaries and essential natures for science, social science, or the humanities. Such boundary-drawing was a part of the spectator's approach to knowledge. If the spectator theory is set aside, then

> [We] shall not think that "the study of man" or "the human sciences" have a nature, any more than we think that man does. When the notion of knowledge as representation goes, then the notion of inquiry as split into discrete sectors with discrete subject matters goes. . . . The lines between subject matters get drawn by reference to current practical concerns, rather than putative ontological status. (Rorty, 1982, p. 203)

Dewey had argued to similar effect, but with greater emphasis on the actor's part in knowing.

> If we see that knowing is not the act of an outside spectator but of a participant inside the natural and social scene, then the true object of knowledge resides in the consequences of directed action. . . . [O]n this basis there will be as many kinds of known objects as there are kinds of effectively conducted operations of inquiry which result in the consequences intended. (Dewey, 1929, p. 157)

From that pragmatic stance, there is no reason to question a hybrid in advance simply because it is a hybrid of familiar forms; genres are properly blurred by our current practical concerns. Rather, two questions should be asked. One, drawn from Dewey's remark, is whether the operation of inquiry results in the consequences intended. In this case, one should ask whether the inquiry helps to overcome the disintegration of schoolteaching practice and provides a complex understanding that helps us to reconcile our diverse educational purposes in particular situations. That is a question of results; it should be deferred.

The other question, drawn from Rorty's remark, is whether there exists, or can be organized, a community of inquiry that is prepared to make bracing remarks about an inquiry, and so to assure that it is, in Dewey's term, "effectively conducted." In Rorty's argument, such a

community of inquiry is crucial because

> there are no constraints on inquiry save conversational ones--no wholesale constraints derived from the nature of the objects, or of the mind, or of language, but only those retail constraints provided by the remarks of our fellow-inquirers. . . (Rorty, 1982, p. 165).

That remark invokes Geertz's caution about the blurring of genres:

> All of this fiddling around with the proprieties of composition, inquiry, and explanation . . . is about as likely to lead to obscurity and illusion as it is to precision and truth. If the result is not to be elaborate chatter or the higher nonsense, a critical consciousness will have to be developed. (Geertz, 1981, p. 23)

Combining Rorty's and Geertz's remarks, I suppose that the prospects for achieving responsibility and discipline in a prospective genre of inquiry lie in the availability of a community of inquirers that cultivates a critical consciousness regarding that genre. I suppose that such a community exists regarding educational design, so that design-as-inquiry might proceed responsibly.

Educational Inquiry as an Educational Pursuit.

The choice and development of forms for inquiry into schoolteaching is not only a methodological matter, but also an educational one. To undertake inquiry with the intention that it should be useful or influential in schoolteaching is to anticipate that the results of the inquiry might be used in an attempts to inform, persuade, direct, or control schoolteachers. Because the results of the inquiry will have educational uses, the inquiry itself may be subject to educational considerations.

Gary Fenstermacher (1978, 1986) argued just that in his critique of common uses of the process-product research. That research, he argued, lent itself to a decontextualized and disintegrated conception of teaching that abetted efforts to govern teaching by establishing a collection of allegedly generic rules. He objected not only to that conception of teaching, but also to the resulting conception of teacher education as a matter of getting teachers to follow the rules. That was, he argued, an uneducational stance toward teachers.

Fenstermacher summarized the opposing position; he called it the "transformation schema," credited it specifically to Thomas Green, and attributed it to many educational philosophers.

> Education, for Green, is largely a matter of transforming a person's subjectively reasonable beliefs to objectively reasonable beliefs. The transformation . . . is undertaken by developing the student's capacity to reason and by presenting evidence for or against subjectively reasonable beliefs. "The determination of 'what is reasonable for me to believe,' in the light of what men have discovered to be defensible beliefs, is the project any man embarks upon when he sets out to think." . . . Though this particular way of stating what is meant by education is unique to Green, his general thesis is comparable to that argued by many other contemporary philosophers of education. (Fenstermacher, 1978, pp. 167-168)

> All normative theories of teaching that have passed the philosopher's review place a premium on rational processes, moral deliberation, and virtuous action. . . . No theory known to me permits indoctrination, mere recitation and rote, conditioning (at least not without informed consent), drill and practice without reflection and analysis, or conformity to rules without deliberation on the rightness of those rules. (Fenstermacher, 1986, p. 46)

From that stance, the proper use of educational theory and research is not to produce rules for teachers to follow, but is to provide them material that aids them to transform their views.

On such grounds, I suppose that the array of inquiries addressed to schoolteaching should include a kind that is shaped as much by the transformation schema as by any other consideration. Its selection and framing of problems, its methods, and its mode of reporting should be suited to supplying schoolteachers "the means to structure their experiences in ways that continually enlarge their knowledge, reasoned belief, understanding, autonomy, authenticity, and sense of place" (Fenstermacher, 1986, p. 46).

In that regard, design-as-inquiry may have advantages. To begin with, the form tends to address educational problems that schoolteachers are likely to recognize as problems for them. It relates abstract resources to those problems, and so may help teachers to employ educational theory and research to structure their experience. Both Lee Shulman and Walter Doyle have suggested recently that teaching knowledge (teachers' knowledge) tends to be case knowledge, organized by and bound up with the problems of teaching particular chunks of subject matter to particular

students in particular circumstances (Shulman, 1987; Doyle, 1990). Perhaps design-as-inquiry will offer schoolteachers academic knowledge in a familiar form that parallels their own.

Beginning the Year in Introductory Biology

It seemed to me that the preceding arguments, suggestions, and possibilities deserved a try--a sample that could be examined and discussed. In a dissertation (Bird, 1990), I sought a workable form for pragmatic studies--eclectic and deliberative studies--of schoolteaching. As suggested above, I wanted that form of inquiry to resist both the disintegration of practice and the submergence of its moral aspects. I wanted to pursue understanding in a form that is suited to the transformation schema, and perhaps to teachers' form of knowledge. I undertook a demonstration of design-as-inquiry.

In the demonstration, I wanted to understand this problem: How could or should some science teachers in a given high school begin their introductory biology classes, that is, get those classes organized and underway in the first few weeks of the school year? I sought a complex understanding, specific to the problem, that would complement the narrower and more general understandings that are more often pursued in educational research.

The work was done in four stages: present a problem of schoolteaching, frame it for eclectic discussion, report a set of arguments relevant to that problem, and compare two or more programs for dealing with it.

Present a Problem in Schoolteaching

The first step was to choose and present a problematic situation in schoolteaching, that is, a set of circumstances that teachers might interpret and act on in various ways. I chose the beginning of the year as a promising site for study because important issues of conducting the class tend to be unsettled around that time and because the way in which those issues are settled tends to have consequences throughout the year.

My purpose in focusing on a practical problem was to relinquish the stance of the spectator or specialist and to take, if only approximately, the stance of "the participant inside the natural and social scene." That stance gives priority to the integrity of the problem over the integrity of any abstraction that may apply to it, and so defines any such abstraction as a tool of action.

To avoid over-investing in an uncertain form of work, I began with some information that I happened to have--biology teachers' reports of their working situations--, added a few of my own observations from a few visits to their schools, added some common concerns in schoolteaching, and constructed a thinly-described problem to work on. (More commonly, I think, a study like this would use whatever descriptive methods seem appropriate to gather problems from the field.) Here is the quasi-practical problem with which I began:

Introductory Biology at Nolan-Barnes High School

Fred Jones, Ursula Martin, and Henry Ortiz teach the introductory biology classes at Nolan-Barnes High School, a sprawling facility that serves about 1,500 students drawn from a combination of affluent, middle class, and poor neighborhoods. The students from the better-off neighborhoods tend to be mostly Whites; the students from the poorer neighborhoods tend to be mostly Black and Hispanic.

For the last ten or twelve years, Fred, Ursula, and Henry have worked together to teach the high school's introductory biology courses. They work from a course plan that they prepared together in accordance with their district's curriculum guidelines. They share the work of securing supplies, preparing labs, and other special activities. While they seldom appear together in the same classroom, they do have frequent, brief opportunities to compare notes.

An Occasion for Deliberation. As part of a school improvement project, Nolan-Barnes's principal has provided Fred, Ursula, and Henry some time to review and improve the introductory biology program. The three teachers start from the beginning. They recognize that the first few weeks of class play an appreciable part in their own concerns about and aspirations for the biology courses. Setting aside questions of student assignments, parental concerns, and school conditions, the teachers would like the introductory biology courses to begin more attractively and productively than they often do. A lot gets done--or not--in the first few weeks of the year.

To begin with, there is the problem of learning the names of 150 students, not to mention getting acquainted and establishing some kind of working relations with them. Getting acquainted is part of a larger task of getting organized and establishing expectations and routines for the classes. How you start the year tends to shape the whole year. That is a two-edged sword. The teachers usually can get things going smoothly reasonably early in the year, but once a pattern is settled, venturing away from it can be difficult. If the

> teachers try to depart from the accustomed cycle of lectures and other presentations, seatwork, and laboratories, they are likely to find their classes in a discouraging state of confusion.
>
> Both the district's curriculum guide and the district's textbook call for introductory biology to start with "the science of life"--an introduction to the field of biology. The teachers would like to do this well, both because they regard biology to be an important subject in its own right and because introductory biology is the last science course that many of the students will take. The teachers would like to capture students' interest early and maintain it through the year. They want to provide an introduction that makes what follows more comprehensible.
>
> All three teachers want to see their students doing more sophisticated thinking, engaging more actively with important ideas in biology, and getting into more probing investigations of biological topics than has often been the case in the past. Many students have seemed willing enough, but too often, even the more advanced students have seemed to assume that the object is just to get the assignments done. While most of the students have applied themselves reasonably well, they have tended to achieve only a superficial understanding of biology. Work in laboratories usually has been orderly enough, but somewhat mechanical, as though the students weren't really engaging the problems. This year, the teachers would like to see the students show more of the spirit of science and to take greater pride in good work.
>
> To sum up, the teachers do not think that things are going so badly; they would just like to see things going a good deal better than they are. Fred, Ursula, and Henry have a lot to consider. What is most important to think about? What is going on now and why? What are the options for proceeding otherwise? How would those alternatives, whatever they are, be carried out? It is a substantial challenge just to organize the issues so as to deal with them systematically in any plan for the first few weeks. That plan must recognize differences among the teachers and their students; while the three science teachers prepare a general plan together, each reserves latitude to execute that plan as she or he sees best.

In Joseph Schwab's terms, this is a "quasi-practical" problem; it involves a class of situations that are sufficiently similar to be included in one deliberation, but sufficiently different that, in dealing with any situation in the class, the results of the deliberation must be treated with caution.

Frame the Problem for Study

The second step of the analysis was to frame the problem in a way that tends to preserve its integrity and at the same time invites and organizes the eclectic use of various arguments from educational theory and research. I constructed that framing in a play on Schwab's commonplaces of teaching--teacher, students, subject matter, and milieus. Those commonplaces provide topical, as distinct from theoretical, framing. Such framing permits an analyst to outline parts of his analysis, while at the same time limiting his commitments to any particular theory about any of

those parts. The framing surveys broad areas of concern that should not be ignored, and so provides a scaffolding within which to construct the analysis.

While I adopted Schwab's strategy of topical framing, I also judged that his list of topical commonplaces (teacher, subject matter, student, and "the milieus") was inadequate for my purposes. To begin with, "the milieus" is a residual category; it might have been labelled "everything else." One important part of everything else in schoolteaching, I thought, is the school class, considered as an entity in its own right. Moreover, I saw reason to treat the class not as a contextual item, but as a constitutive one: Teaching to a collection of students is a central feature of schoolteaching.

Second, taken just as a list, the terms "teacher," "student," and "subject matter" do not resist the reduction of the schoolteaching problem to one set of abstract terms. For example, one might discuss the subject matter, the teacher in terms of his understanding of the subject matter, and the student in terms of his misconceptions of the subject matter, thereby reducing three potentially different topics to one set of terms.

Therefore, I constructed a construal of the commonplaces that would help to represent the schoolteaching problem compactly, would resist reduction of the problem to one set of terms, and would invite the eclectic use of a balanced collection of arguments of different kinds. Here it is:

Schoolteaching as a Fourfold Problem

> Imagine a schoolteacher who is sitting at a kitchen table planning a unit on photosynthesis for students with a wide range of reading abilities, or walking to the chalkboard to begin a lesson on one-celled organisms with a class that got out of hand yesterday, or consulting with a parent about a student's progress, or arguing with another teacher about classroom management, or monitoring groupwork while considering what appear to be bruises on John Student. Or, considering how to begin the introductory biology course. Each such task may be regarded as a complex problem involving four different kinds of considerations, all of them entwined with the others.
>
> The Teacher is Responsible. First, the schoolteacher is responsible to a profession, to a community, to a school district, to students, and to others for satisfying an array of important principles and for achieving a set of results including protection of children, promotion of citizenship, pursuit of justice, and mastery of school subjects including biology. That partial list of responsibilities and results cannot reasonably be reduced to its

last item; there is no simple bottom line for schoolteaching. So the teacher well might be asking, for example: What are my responsibilities? To whom? For what? Toward what should I strive? What limits or principles should I observe in doing so? How should I conduct myself; what should be my manner? The schoolteacher's responsibilities are one part of the problem; arguments about what is good and right and legal will be brought into play here.

The Subject Matter is a Domain of Valuables. Second, the teacher conveys or represents a subject matter to students, or engages them with it. That subject matter--here, biology--is not only a collection of information and skills. It also is a structure of perspectives and theories. And, it is a set of ways of knowing and learning about the living world. And, it is an organized field of worldly activity that can have important consequences. And it is, at least potentially, an intrinsically satisfying exercise of the mind. To teach the subject matter is to somehow give students access to all those valuable features of it. Here the teacher's questions might be: Of the matters to which my class is generally addressed, what should I teach? What is known, and with what assurances? What is important or useful or satisfying for students to know? How do I get it across, make it accessible, engage the students with it? The second part of the problem is the subject matter, seen as a domain of valuables, of goods that students could realize in the study of biology. Arguments about knowledge and knowing in biology, together with teaching considerations particular to biology, will come into play here.

The Students are Experienced Actors. Third, the teacher works with and in a crowd of students who must be considered as individuals. They are not blank slates or unmolded clay; they arrive with ideas about the living world that might or might not match biologists' ideas about the same matters. They are not empty vessels sitting to be filled, but are experienced actors who participate in making their situation whatever it turns out to be. They are not identical, but are differentially equipped and differently inclined; they hold different memberships in different settings outside the class and outside the school. Little that the teacher can do will affect them all in the same way. Questions about the students include these: Who are my students, when I consider them as individuals? What is their condition? What do they perceive, believe, feel? What has been their experience with biology? What do they want; what moves them; what interests them? How do they learn; how does their condition change? The students considered as individuals are the third part of the problem. Arguments about their individual situations, characteristics, and processes are brought in here.

The Class is an Organization. Finally, the classroom's crowd of students cannot be understood only as a collection of individuals. They also constitute an actual or potential organization--a social system. That organization both has its own dynamics and is affected by other social units, e.g., cliques in the classroom as extensions of the student groups in the school or neighborhood. As an organization, the class has its own distinctive properties, problems, and educative or miseducative influences. Thus, it is both a means for instruction and an element of curriculum. A teacher might be asking: How is my class organized, or might it be? What do the members share or hold in common? What divides them? What are their relations with each other, expectations for each other, and respective positions in the class? How do they work together? What do they learn from all that? The class, considered as an organization, is the fourth part of the problem, and arguments of a social sort will apply.

> While those four aspects of the schoolteaching problem can be conveniently separated In the foregoing paragraphs, they are intricately entangled in practice. Resolving the four parts of the problem in one coherent and effective line of action will be, and sometimes is, the schoolteacher's achievement.

Limiting the Analysis. Third, I noted that all four parts of the schoolteaching problem, as construed, have "milieus." Considered as a responsible agent, the teacher operates in a complex environment of morality, law, and politics. Considered as an element of a classroom, a subject matter such as introductory biology resides not only in the environment of a school and district curriculum, but also in the environment of biology taken both as a discipline and as a part of many activities in society. The student as an individual exists in places other than the classroom, for example, his family and neighborhood. Finally, the school class is a small component of a complex organizational system that is bound up in a society's economy and institutions.

I did not want attempt an analysis quite so eclectic as to encompass all those matters, so I introduced a distinction between the "internal problematic of schoolteaching"--matters that appear to arise directly from the activity of teaching the class--and the "external problematic of schoolteaching"--relations between the operations of a school class and features of its environment. That distinction gave all four commonplaces the same horizon with regard to the classroom.

Further, I tried to press the external problematic into the background of the analysis in order to concentrate on some features of the internal one. By that decision and by the selection of arguments to include, I set up an analysis that tends to be traditional, liberal, and amelioristic. That is, my decision to acknowledge and set aside the teaching problem's external features might be read as a qualified acceptance of the general social order in which the introductory biology class operates. My selection of arguments to include in the analysis, e.g., Rawls's argument concerning justice, may be read as a liberal attempt to make that order work while ameliorating some of its disagreeable tendencies. A radical or critical argument might have offered quite different framing, for example, by casting the classroom as a cockpit for reproduction of a class structure. A feminist argument might have placed classroom happenings in the context of gender.

A Family of Analyses. Within its limits, my construal of the problem defines a potential family of analyses; the members of the family would vary from each other according to the specific arguments chosen to carry them out. Depending on the number and kind of arguments chosen to carry it out, any analysis in the family could grow quite complex. The fourfold framing provides a structure for associating arguments with the problem and with each other, for grouping arguments for discussion, and for establishing an order of presentation.

Applying the general idea of the fourfold problem to a given schoolteaching situation is analogous to constructing an object of inquiry by applying a concept or theory. Where another student of schoolteaching might have applied a theory of status organizing processes to construe the beginning of the year as a sociological object for a quantitative study, I used the idea of the fourfold problem to compose a more complex educational object for a pragmatic--eclectic and deliberative--study.

I intended the framing both to preserve the sense of the schoolteaching problem as a complex whole and to invite and organize the eclectic use of diverse arguments from educational theory and research. As cast, each element of the fourfold problem suggests a large class of arguments relevant to the problem; for example, "the schoolteacher's responsibility" will be addressed by moral and legal arguments, "the class as an organization" will be addressed by social ones. Taken as a whole, the framing defines a family of possible analyses that employ different arguments from the relevant classes. By selecting a set of arguments and applying them to the schoolteaching problem, I would carry out one analysis in that family.

Gather the Arguments

Having described the problematic situation and having framed it as the fourfold problem, I undertook an eclectic interpretation of the problem in the terms of eight arguments pertinent to the problem as framed. I am using "argument" here to embrace a diverse set of materials. In regard to the schoolteacher's responsibilities, I included a conception developed by analogy to trusts in law

(Bird, 1987, following Beck et al., 1978), along with a rendering of John Rawls's theory of justice (Rawls, 1971). In regard to the class as an organization, I chose Travis Hirschi's theory of social bonding as a source of order (Hirschi, 1969), and Elizabeth Cohen's discussion of a small set of sociological theories applied to groupwork (Cohen, 1986) . In regard to the subject matter as a domain of valuables, I reviewed a widely-used introductory biology textbook's opening summary of "biological themes"--evolution, reproduction, structure-function, and so on (Towle, 1989). I matched that discussion with Lee Shulman's account of the "pedagogical reasoning and action" by which teachers convey subject matter to students (Shulman, 1987). In regard to the students as experienced actors, I drew on John Dewey's philosophical account of Experience and Education (Dewey, 1938), along with Charles Anderson's and Kathleen Roth's reports of naturalistic and experimental field research into links between teaching methods and student learning in science (Anderson, 1987, 1989; Anderson and Roth, 1988).

These arguments are of different kinds and, for their kind, are in different states of development, testing, and application. They satisfied the plan to work with diverse materials. Following sections summarize the arguments, which are presented in the format of the fourfold problem.

The Teacher is Responsible. Schoolteachers are responsible to several parties for observing a range of principles and for achieving a variety of results. The two arguments on this topic provided different ways to express those responsibilities.

Entrusted with Children. In the trust argument, a schoolteacher does not stand in the place of the parent, but has an independent responsibility for the child. The child is regarded not as property but as a person with liberties that he cannot yet fully exercise, but that he should exercise increasingly as he matures. When the teacher takes charge of the child for the purpose of schooling, the teacher is entrusted with the child, his liberties, and his prospects. As a trustee, the teacher is held to a high standard of care for and loyalty to the student.

One branch of that standard arises from the day-to-day relationship between the teacher-trustee and the student-beneficiary. This branch emphasizes immediate considerations and consequences; the teacher should attend to the student's safety, well-being, engagement, inclusion, and satisfaction in the class. The other branch of the standard arises from the purpose of the trust and emphasizes eventual results: The teacher should cultivate the student's capacities to exercise the full range of her liberties in due course. Both branches of the standard are concerned broadly with the student's physical, intellectual, emotional, social, and moral growth. Taken together, the branches of the standard balance each other; the child should not be abused for the sake of his future, nor should he be aided to fritter it away in current amusements.

Justice in the Classroom. In terms drawn or derived from John Rawls's argument regarding justice, teachers need a working charter for a well-ordered human association. A central principle for that association is this: Students who have been most fortunate in school to date should progress by arrangements and means that are also to the best advantage of students who have been least fortunate in school to date. In gauging "progress," the teacher should be concerned not only with the students' academic achievements and any contribution those achievements may make to the students' eventual economic and social well-being, but should also be concerned with the students' enjoyment of the culture of their society, with their ability to take part in its affairs, and with the students' sense of their own worth.

Establishing justice is not only a matter a creating a state of affairs but also a matter of forging shared understandings about those affairs. The teacher should describe, teach, and model a public conception of justice by which it will be rational for all the students to participate fully in activities that benefit them all. In these conditions, students should form a preference for just arrangements among them and learn to practice fraternity: a preference for thriving in ways that also benefit others.

Taken together, the arguments regarding entrustment and justice suggest the range and variety of the teacher's responsibilities. We may compose a class for the particular purpose of teaching biology, but it is not in our power to limit the results to that purpose. Once it is composed, a school class is a complex human situation from which a range of results are probable; the class should be arranged and conducted with that in mind.

The Subject Matter is a Domain of Valuables. The two arguments about the subject matter are concerned with relations between biology as it is understood and practiced by biologists and biology as it may be studied and understood by high school students. In one argument, that relationship is mediated largely by a textbook's presentation, specifically, the portion of Chapter 1 of Modern Biology (Towle, 1989) that I reproduced and discussed in my analysis. In the other argument, drawn from Shulman, that relationship is mediated largely by the teacher's own understanding and action.

Selecting the Subject Matter. From the discussion of biological themes, concepts, and theories in Chapter 1 of Modern Biology (Towle, 1989), what will the teachers elect to teach? That chapter introduced a set of "biological themes": evolution, reproduction, development, structure-function, energy relationships, ecology, and bioethics. From my examination of Chapter 1, I concluded that it tends to mask the problem of explanation or understanding in science; the themes appear not as provisional solutions to a set of central problems and questions, but as finished accomplishments. With advice from commentators (Hurd, 1988; Martin, 1985; Schwab 1962, 1963), I argued that the science teachers should bring the problem of explanation to the fore. At the same time, they should help the students to know where they stand by treating the textbook as what it is: a writer's account of biologists' accounts of the living world. Both the biologists and the textbook writer can get it wrong. There is a problem of proof, knowledge, explanation, or understanding. The students will not be able to take that problem seriously, or to appreciate

biological ideas that have proved to be durable and useful, if they are also asked or allowed to take for granted the text that they hold in their hands.

Again with advice from the commentators, I suggested that the most valuable lesson that the students could take from Chapter 1 of Modern Biology goes something like this: In their attempts to describe, explain, predict, and control living matter, biologists have constructed and tested a variety of concepts and arguments. Some of them have been more useful and defensible than others. A few of them deserve special attention, both in their own right and as models of scientific understanding. Those central concepts and arguments describe different phenomena and speak differently about them, yet are tied to each other in important ways; understanding one argument helps to understand others. Those concepts and arguments have proved to be so revealing and so widely useful that everyone would want to understand and use them. Moreover, everyone has a reasonable prospect of learning to do so in introductory biology.

As an outline for an exhortation to students prior to reading Chapter 1 of Modern Biology, the preceding paragraph may be serviceable. However, it is likely to be a lie if students are left on their own resources to cope with the text. Skillful mediation by the teacher also will be needed.

Teaching the Subject Matter. Given a provisional decision about what to teach, how will the teachers prepare themselves to teach it to the students in their classes? In terms drawn from Shulman (1987), the teachers' central task is to transform their own understanding of biological ideas for the purpose of teaching. They must think their way from the ideas to be taught into the minds of the students they will teach. That transformation is accomplished as teachers study the text to select the ideas that are most important to teach; as they organize those ideas for study by the students; as they search for analogies, examples, demonstrations, and explanations by which to represent those ideas faithfully and effectively; as they attempt to embody those representations in instructional procedures and methods; and as they adapt the representations and methods to the

students to be taught. All those processes are specific to the matter to be taught (in the longer analysis reported here, I gave examples involving the subject matter discussed in Modern Biology).

The Students are Experienced Actors. The two arguments on this topic do not deny that introductory biology students will be immature, ignorant, impulsive, and mistaken in various ways. Rather, those arguments serve to balance the picture. The students do not arrive at the biology class completely chaotic and unformed; compared to their experience to date, the biology class is a modest increment.

Experience and Education. How will the teachers cope with students' prior experience and use it to promote desirable habits of thought, feeling, action, and interaction? In the terms drawn from Dewey's analysis of experience and education (Dewey, 1938), a student's experience is both continuous and, in part, his own making. The student emerges from each successive situation different than he was. His accumulating experience makes each new situation what it will be for him, and so influences what he will help to make it by his interaction with things, people, and ideas. Through that interaction, he will be changed again. The question then is what will be the trend of that continuous experience, whether it will increase or restrict the students' capacity for further experience, whether it will increase or restrict the student's capacity to form and pursue his own purposes intelligently.

Dewey's argument suggests that the science teachers need to learn a great deal about their students' prior experience, so that they may design new situations that promote growth. In those designs, they should strive to capture the students' inner attention to the subject matter, as distinct from external shows of conformity to expectations for class work. The teachers should work toward a progressive organization of the subject matter in which students relate new objects and events to their earlier experiences and gain in their conscious articulation of concepts and arguments. As they strive to shape the current situation so as to form students' experience of the immediate subject of study, the teachers also should attend to the "collateral learning," of attitudes

and values, that accompanies those studies. Throughout, the teachers should arrange the situation so as to foster students' abilities to form and pursue their own purposes intelligently.

Students' Learning of Science. How will the teachers help students to achieve the conceptual change that often is required to gain a useful understanding of scientific concepts and arguments? In terms similar to Dewey's discussion of "progressive organization of the subject matter," Anderson and Roth (1988) argued that scientifically literate adults and students who achieve the greatest understanding of science tend to relate scientific ideas to each other and to integrate those ideas with their personal knowledge. In their studies, students who achieved such understanding were inclined and able to use the ideas they were taught to describe, explain, predict, and control objects and events that they encountered in a variety of situations. With the aid of effective materials and instruction, they reconstructed their prior conceptions of living matter, and so gained ability to participate in communities that construct and employ scientific knowledge.

Those authors further argued that a useful understanding of science is most likely to be produced by composing the class as a learning community that undertakes some meaningful scientific task, which creates the occasion for "scaffolded dialogue." In scaffolded dialogue, the teacher engages the students with the problem or task and explores their current conceptions of that problem; the teacher aims both to learn about students' prior conceptions and to induce dissatisfaction with them. The teacher then introduces relevant scientific concepts and theories in simplified but faithful forms, models the use of the scientific ideas to cope with the task, and coaches the students in their efforts to do likewise. Gradually, the teacher reduces or "fades" the coaching while students undertake more independent practice; the object is to increase the students' capacity for self-regulated learning of scientific ideas from a variety of sources.

The Class is an Organization. In these two arguments, the social organization of the class appears both as a means to teach biology and as an element of curriculum in its own right. Taking students individually, one may say that they learn important lessons from the ways in which they are

organized to work with each other and the teacher in the class. Taking the students collectively, one may note that important results such as acquaintance, membership, friendship, and mutual expectations for cooperation cannot be reduced to the image of individual learning; the influences of schoolteaching on collectives also must be considered

Moral Order and Bonding. How will the teachers promote orderly and productive conduct by students in the classroom? In the social bonding argument (Hirschi, 1969; Hawkins and Weis, 1985; Hawkins, Doueck, and Lishner, 1988), the teacher's and the class's moral influence depends on the formation of social bonds among the teacher and students. Those bonds form as the members of the class realize value through their interaction. From the bonding argument, I inferred that the facet of the bond called "involvement in conventional pursuits" grows with interest, challenge, moderate risk, freedom of movement and choice, and knowledge of results. Similarly, the facet called "attachment to conventional persons" grows with acceptance, support, warmth, and mutual obligation. The facet called "commitment to conventional lines of action" grows with gains in usefulness, competence, influence, and prospects for the future. Finally, the facet called "belief" in the moral validity of prevailing arrangements grows with exposure to rules that are shown to be necessary, and that are enforced consistently across time and fairly across persons with rewards and punishments that are proportional to achievements and offenses.

The teacher may influence the students' prospects for realizing value from the class and thus promote social bonding by organizing the range of opportunities suggested in the preceding paragraph, by teaching social and other skills that students need to exploit those opportunities, and by allocating sanctions (rewards, recognition, criticism, punishment) that are within her powers (see Hawkins, Doueck, and Lishner, 1988). Thus, in the bonding argument classroom order is neither separate from task organization nor a precondition for subject matter teaching. Rather, achieving order is an integral part of organizing the class to carry out its work on a subject matter.

Task Organization. Provided some external conditions, such as the necessary training and support, the science teachers may have a choice of structures for student participation. Lectures, teacher modeling, whole-class discussion, seatwork, and activity centers, for example, tend to give students different sorts of opportunities and responsibilities, place them in more active or more passive positions, increase or reduce their interaction with each other, and so on.

I focused on one potential structure of participation: cooperative learning by heterogenous groups of 4-6 students. In terms borrowed principally from Elizabeth Cohen (1986), such groupwork is most likely to be effective when, first, the teacher clearly delegates specific tasks and responsibilities to the groups--and honors those delegations in his procedures for monitoring group activity. Next, the activity should be organized so that students must depend on each other either to complete the task or to obtain any rewards that may flow from it, or both. Third, many students have little experience in such groupwork, so need training and coaching in the relevant norms and routines if they are to cooperate productively. Finally, status characteristics such as sex, race, and academic or social standing are likely to affect group interaction to the detriment of the lower-status students; systematic interventions will be needed.

Conduct a Deliberation on Alternative Programs

When those eight arguments had been assembled and related to the fourfold teaching problem, the final step of the analysis was to compare the problems and prospects of two programs for beginning the year in introductory biology.

One program relied heavily on the groupwork procedure that Sharan and Schachar (1988) called "group investigation." After some preliminary introduction to the class and some preliminary practice in groupwork, the teacher could present the class with a set of group projects. Each project would include a description of some phenomenon to be explained, for example, variation in Galapagos finches. The group would be assigned a pair of the "biological themes" from Chapter 1 of Modern Biology, for example, "natural selection" and "reproduction and

inheritance," to be considered in explaining the phenomenon. Finally, the group would receive a set of questions to this effect: "How might your group use each of these concepts or theories to account for this phenomenon?" And, "Are these two concepts or theories related in any way that you can see? If so, how are they related?" Over the following two or three weeks, the students would complete the remaining stages of the investigation. They would plan their group's study and divide the labor. They would gather, share, and discuss information. They would plan a final report to the class, and would present that report in a way that both uses various modes of presentation and involves the rest of the class. The class as a whole would discuss and evaluate the group presentations. Thus, the class would be introduced to the phenomena and ideas that they would study for the year, and would be organized to undertake those studies.

The other program for beginning the year relied heavily on whole-class interaction between teacher and students that Anderson and Roth (1988) called "scaffolded dialogue," which was described earlier. As I imagined this program, the teacher would begin by asking the students to name and describe as many organisms or kinds of organisms as they can, perhaps skimming their textbooks to add to their collection. The teacher would be assessing the students' breadth of experience, their informal taxonomy, and some of the associations that they make with various organisms, for example, whether they tend to associate organisms with their common habitats, or tend to see them as they might appear in an ill-equipped zoo cage.

By asking and helping the students to produce a menagerie, the teacher would be building a base of description for four summary observations, which she would offer to the class as something worth understanding. Life on earth is diverse. Within that diversity, there are patterns and similarities. Species can change and have changed over time. A given organism is more likely to be found in some places than others. Of those generalizations, the teacher then would ask the class, Why is that so? How did it come to be? The teacher would explore the students' current knowledge and conceptions.

Then the teacher would call the students' attention to the survey of concepts and theories in the first chapter of their textbook, ask them to relate those scientific ideas to the four observations, and help them to do so by modeling and coaching the derivation of such relations, then fading the coaching so that students could practice a bit on their own. In this fashion, the teacher would hope to capture the students' attention and interest, help the students to survey the resources that biology provides for understanding the variety of life, and introduce them to their studies for the year.

Sketching. As I began the description and comparison of the two programs for beginning the year, I faced a serious three-way difficulty. First, in summarizing eight arguments relevant to the teaching problem, I had provided many matters to think about; to ignore any of them might waste that work. Second, however, too long a discussion of all those matters would tend to absorb me and the reader in the wealth of detail, and so put us at risk of losing sight of the teaching problem as a whole. Finally, rising to higher abstraction in order to gain compactness would tend to put us out of touch with the problem as something that a particular teacher has to deal with.

I tried to resolve the difficulty by resorting to a treatment that I called "sketching," the analogy being that a line drawing may convey a complex picture by presenting some important details and leaving many others for the viewer to fill in. So, in sketching the two programs, I would describe something that a teacher might say or do to conduct a group investigation on one day, then skip to a later moment and give a similarly concrete description.

When the program sketches were completed, I summarized each of the eight arguments I had assembled earlier, and used them in turn as a basis for an equally sketchy commentary on the two programs. For example, I proposed that the group investigation had the advantage over the scaffolded dialogue in regard to justice, because it was more clearly a procedure in which students who have been most fortunate in school progress in ways that are to the best advantage of students who have been least fortunate. In that same regard, I noted that groupwork provides an organization in which students can practice fraternity, and are encouraged to do so. In regard to

Shulman's arguments regarding the transformation and representation of subject matter, I noted that the two programs would proceed in rather different ways. In the group investigation, the teacher would embody her representations of the subject matter largely in the materials given to the groups, and in the group interaction itself. In the scaffolded dialogue, the teacher would embody her representations of the subject matter largely in her own participation in the scaffolded dialogue. All else being equal, the choice between the programs would depend specifically on the matters to be taught, the relative emphasis to be placed on them, the materials that are available to a given teacher, and the teacher's own command of the subject matter. Throughout this commentary on the programs, I relied on readers to draw on the earlier, fuller, presentations of the eight arguments, fill in gaps, and pursue connections in which they are most interested.

The sketchy comparison of programs set up an interesting interplay among arguments that suggested a variety of problems of design and tactics. I pursued one of those tactical problems briefly to see what fruit the fourfold analysis might bear at its more detailed levels. The issue in the following passage is how the teacher may achieve initial order in the class.

An Exploration of a Tactical Problem

As suggested by the eight arguments, diverse educational desires are associated with beginning the year in biology: promoting reasonable conformity to rules and etiquette, fostering fraternity among the students, encouraging comprehension of problems of explanation in science, promoting understanding of particular scientific explanations, encouraging students to form their own purposes and pursue them intelligently, and so on. Call this set of desires "humane, productive association." The deliberation on programs organized a pursuit of working harmony among those desires, that is, an attempt to find workable activities that might avoid trading one desire for another, but rather might achieve them as a set. It appeared that both the group investigation and the scaffolded dialogue might be refined and elaborated to achieve such humane

and productive association, although with different emphases on the desires in the set. Both programs would have to be worked out in more specific tactics.

For example, in the terms of social bonding argument (Hirschi, 1969), the teacher could promote the students' "commitment to conventional activity" by enabling them to realize the value of competence, and so promote a humane form of order in the class. However, as the teacher enters into the encounter with the students at the beginning of the year, the situational meaning of "competence" is not yet specifically defined, either in the sense of being described by the teacher as a figure of authority in the classroom or in the sense of being accepted by the students as participants there.

One option for establishing a specific and shared meaning of valued competence lies in the subject matter. In Shulman's terms, the teacher's ability to place the value of competence in reach of the students depends to some large extent on the teacher's repertoire of representations, of which analogies are one kind. Those representations must consider the students as individuals; to help them construct new meaning, one should relate new notions to their prior experience.

The sketch of the scaffolded dialogue had described a move that the teacher might make. The teacher would introduce problems of explanation and of learning from secondary sources (a textbook) by employing an analogy to the student's familiar problem of interpreting gossip. The teacher might begin by asking the students to consider a piece of gossip: Rene´ says that Jane says that Mario and Elise are seeing a lot of each other, probably because opposites attract. Notice that this gossip has the same general structure as a textbook writer's account of a scientist's theory. By working with the students to refine their ability to interpret and to test such gossip, the teacher would attempt to provide the students new understanding both of explanation and of the problems of learning from secondary sources. The students might then be in a better position to appreciate both the problems of explanation in biology and the problem of learning from their textbook.

Taken together, the several arguments suggest the combined inference that the teacher's use of analogy to relate the new subject matter to the student's prior understanding serves to establish a specific and meaningful domain of competence that students can understand and accept, assists the students to realize that value, and so promotes the bond called "commitment." By such tactics, the teacher might hope to pursue order founded in an engaging task and so promote the working harmony among diverse educational desires that I labeled "humane and productive association."

Of course the status of that combined interpretation is problematic; it might, with development and refinement, withstand criticism well enough to warrant a try in a classroom. For the time being, I was satisfied that bringing diverse arguments to the same schoolteaching problem tends to frame and stimulate such interpretations.

The Problem of Endings

One disconcerting feature of the analysis was its open-endedness. Taken individually, any of the eight arguments employed in the analysis might have sustained extended and complex discussions. When the arguments were taken together in relation to the same problem, the complexity was multiplied. I concluded that the analysis could not be brought to a conclusion, and so sought a way to bring to the text to an end.

No End in Sight. The discussion of alternative programs in terms of the assembled arguments could go on to great length, but it could not, in my estimation, reach a compact conclusion. Consider some possible forms for a conclusion. A practical conclusion would be a decision to begin a given introductory biology course using one of the two programs I examined, or some combination of them, or neither of them. That conclusion would require extensive local knowledge; it would be reached by a person or persons who have the local knowledge and who exercise the local responsibility. My discussion could not reach that kind of conclusion.

A qausi-practical conclusion would address some small set of arguably similar situations such as the introductory biology classes of given high school or school district. A conclusion for

that quasi-practical problem could take the form of one or more complete designs, including materials, for beginning the year in the classes in question. Or, such a conclusion might take the form of a design for a continuing education program for the teachers involved. I began my analysis with a quasi-practical problem, but found that I could not reach the corresponding conclusion. The designs for beginning the year or for educating the teachers would again require extensive local knowledge, for example, about the current teaching repertoire of the teachers. Constructing those designs would require an exercise of local responsibility regarding, for example, the balance to be struck among the moral, social, and intellectual objectives for the introductory biology course. I could describe a quasi-practical problem, but I was not in the quasi-practical situation. I could not reach that sort of conclusion.

A pseudo-practical conclusion might take the form of one or more purportedly generic designs, complete with materials, for beginning introductory biology courses. Or, some purportedly generic training program for high school biology teachers. Those products might have illustrative value as a resource for local design or teacher education activities. Also, they might support a much more thorough and detailed examination of options, trade-offs, and problems than I attempted in my analysis. That said, I would note that generic designs could not take account of local variation and do not incorporate local knowledge, so they run the risk of being specifically wrong, at least for some class of local situations. The more attractive and plausible such designs became, the more misleading they might be, for any given instance of beginning introductory biology.

I would note also that the materials are not available here for completing even a generic design. In selecting eight arguments for discussion, I excluded all other arguments that might have been chosen; those other arguments well might have given a different sense of the problem and provided a different set of programs. A conclusion in the form of a generic design based on the materials assembled here might attain considerable plausibility, but it would do so at the risk of

short-circuiting local decision-making, and in any case could not achieve authority. I decided not to attempt a pseudo-practical conclusion.

Turning to the possibilities for an abstract conclusion, one possibility would be a propositional synthesis of the arguments that I assembled in my analysis--a baby grand theory. I did not pretend to any such outcome; I cannot imagine what such a synthesis might be like given the variety in the kinds of the arguments that have been assembled here. In what set of terms would one synthesize a contractarian philosophical argument regarding justice and a psychological argument concerning a student's construction of meaning?

As there were some pseudo-practical possibilities for arriving at a program design, there were some pseudo-synthetic possibilities for providing abstract coherence to the arguments that I had assembled. For example, at one time during the analysis, I was enthusiastic about my impression that issues of value pervaded the teaching problem. I saw that social bonding depends on realization of value, that strategies for treating status problems amount to a negotiation of the value of various abilities, as well as an attribution of value to persons; that the teacher is trying to discover the intellectual, emotional, social, instrumental, or moral value in the subject matter and to represent that value faithfully to students, and so on. The matter of value appeared to be a promising rubric for tying the arguments together in an impression of the teaching problem as a whole.

My enthusiasm for that sort of coherence waned considerably when I also saw that I might have said as readily that the teaching problem is pervaded by intellectual issues associated with the subject matter, or that matters of an essentially social character permeate the entire problem, or that the problem is pervaded by the students' individual perceptions and constructions of, and actions toward, all these matters. All that any of those bids for coherence--ploys, I think--could accomplish is to reduce diverse arguments to a set of general terms most associated with one of them, and so to dismiss or conceal the rest. That reduction might have provided a gain in

coherence, but also would have exacted a substantial loss in appreciation of the teaching problem's complexity and variety. I did not seek that sort of conclusion.

Having rejected the preceding possibilities for a practical or theoretical conclusion to this argument, I faced this question: What good is a discussion that goes to considerable trouble and length to assemble a set of intellectual resources relevant to a problem, only to reach no conclusion, either practical or abstract? One possibility, of course, is that the lack of conclusion is simply a failure of knowledge, skill, or imagination on my part; someone else might have derived a compact and reportable conclusion from the same materials.

However, the problem of endings also might be taken to confirm the arguments from Dewey and Schwab with which I began. That is, by virtue of their part-whole relationship, abstractive educational studies cannot attain authority over educational practice. What they can do --and in the transformation schema ought to do--is to provide grist for the schoolteacher's mill, material that will aid the teacher to reconsider her current habits of thought and action. In that case, we should look for the value of the analysis in the encounter with the schoolteaching problem. Supposing that the analysis actually achieved the sort of complex and situated understanding that was sought, one would not expect to carry that understanding away in any highly compact form.

A Restatement of the Problem

Having rejected options for bringing the analysis to a compact conclusion, I completed my text by drawing on the general terms of the arguments that I had assembled to restate the teaching problem with which I began. The following summary is not the yield of the analysis, but only a way to recall its parts and form:

Beginning the Year in Introductory Biology

> At the beginning of some school year, a science teacher encounters the collection of students who have been assigned to one of her introductory biology classes. While the students are immature and ignorant in various respects, they also are experienced actors in the school. Each of the students is travelling a continuous path of experience that at any moment is shaped both by past experience and by current interaction in some complex environment. Each of the students constructs new meaning from his current activity in light

of what he already understands, and so comes to participate, more or less, in the knowledge held by a community, of which he is becoming a member. The teacher's introductory biology class is an effort of that community, and now is becoming a part of the students' environment, a modest increment to their experience. We should ask whether the students' new experience in introductory biology will increase their diverse capacities for further experience and will contribute to their ability to form and pursue purposes intelligently. As the class is an introduction to biology, one particular concern is whether the students' experience in the class will interact with their prior experience to provide them a functional and delightful understanding of the central concepts and theories of that field.

By law, by custom, and by choosing the work, the science teacher is entrusted with those children-becoming-adults, and so owes to them a high standard of care and loyalty. By that standard, the teacher is obliged both to care for the students' welfare today and to cultivate their abilities to exercise the full range of their liberties in due course. Because the teacher is entrusted with all the students, she is obliged to pursue justice in two ways. One is arranging circumstances such that students who have been most fortunate in school to date will progress in ways that also are to the best advantage of students who have been least fortunate. The other is promoting a public conception of justice that would encourage all the students to cooperate in activities and arrangements that benefit them all, and would encourage them to practice fraternity towards each other. At the beginning of the year, the teacher seeks to establish, not merely an orderly classroom, but a well ordered association in his relations with the students, in their relations with each other, and in the understandings and commitments that they share.

In pursuit of the standard of care and loyalty with its call for justice, the teacher has two main instruments for working with the students. One is the teacher's approach to the social organization of the class. The teacher is concerned to establish a moral order, which is founded partly in social bonds of involvement, attachment, commitment, and belief; those bonds form among students and between students and the teacher when they are enabled to realize value in the course of their work together. At the same time, the teacher is concerned to establish a productive work organization, which is defined by its structures for classroom participation--by the groupings, roles, norms of interaction, and status relations that shape the class's work and are to some extent shaped by it. One such structure of participation is groupwork by the students; another is scaffolded dialogue between the teacher and the students.

The teacher's other main instrument of care and loyalty is the intellectual organization of the subject matter that the class will work on. The teacher is drawing on a field of activity in the world beyond the school--in this case, biology. That field cultivates a body of ideas (for example, there is patterned diversity in life; the pattern was produced by a combination of inherited variation and natural selection). Such ideas have been found to be valuable in describing, explaining, predicting, controlling--and enjoying--living matter. By way of his own comprehension both of those ideas and of his students, the teacher seeks to transform the field's valuables for teaching and to represent them effectively, all in order to place them within reach, use, and enjoyment of the students in his class.

The social organization of the class and the intellectual organization of its work are intimately linked in a program of action, such as a group investigation or a scaffolded dialogue. That program is not a fixed thing, but is an ongoing joint creation by the students and the teacher. The students are the program's intended beneficiaries and so should be transformed by it; the students also are experienced actors, so they help to make the

> program of action whatever it turns out to have been. The teacher designs the program of action, but also enacts it; she teaches by way of her own understanding and treatment of the subject matter, by way of her methods, by way of organizing the class, and by way of her manner. As an actor in the scene, the teacher is traveling her own continuous path of experience, of which these students and this class have just become a part. In undertaking to transform the students' beliefs, not only about the living world but also about the way they should live in it together, the teacher also may transform her own beliefs, not only about the living world to which biology refers, but also about her students and about teaching them.

As rendered in terms provided by only eight of many arguments that could have been drawn from educational theory and research, beginning the year in introductory biology emerged as a formidable problem.

Appraisal

The project produced an example of design-as-inquiry, in this form: present a practical problem of schoolteaching, frame it topically to invite the application of diverse arguments, interpret the problem in terms of a set of those arguments, and use the arguments to compare two or more options for dealing with the problem. About this form, I had two related questions. Can the form of inquiry be disciplined, that is, attacked, defended, and developed along characteristic or predictable lines, so as to provide a genre of discourse about schoolteaching? And, supposing that the form can be disciplined, is it good for anything?

Can the Form be Disciplined?

Judging by interaction with my dissertation committee, this genre is amenable to discipline by the bracing remarks of other inquirers. From conversations with the readers, there emerged a predictable set of problems and challenges, about which a community of inquirers can exercise the "critical consciousness" that Geertz called for.

Lines of Attack. The initial description of the problem may be contested, for example, by arguing that the sampling of observations is likely to produce particular errors of omission or of emphasis. Likewise, the topical framing ("the fourfold problem") may be contested in at least two ways. It may be argued that the framing's generally liberal and ameliorative orientation to internal problems

of the classroom tends to conceal or submerge more pervasive issues such as social class, ideology, or bigotry. Another kind of attack would be that the framing's symmetrical attention to issues of the teacher's responsibility, subject matter, students, and class organization tends to misrepresent the relative importance of those matters, either in interpreting the teaching problem or in deriving a strategy for dealing with it.

The selection of arguments with which to carry out the analysis may be contested. A critic may ask, for example, why I chose the social bonding argument over other theories of youthful deviance and conformity. Going beyond the choice among the theories of youthful deviance and conformity, the critic may ask why I choose that topic. Why divide the schoolteaching problem into the four topics that I did? Why not discuss the teacher as an artist/esthete, the subject matter as a set of commodities to be marketed to educational consumers, or the class as an arrangement of objects to be organized in time and space? Indeed, why start with this list of elements: teacher, student, subject, and class? Why not start this list of facets of classroom activity: morality, communication, logistics, and esthetics?

My reply is not a defense. I see nothing necessary either about the topical structure of my analysis, or about the selection of arguments to carry it out, or about the arguments themselves. Rather, my position is that both the topical framing for the analysis and the arguments chosen to carry it out are constructions. They bear no necessary relation to the phenomena to which they refer. They are just more or less likely to withstand criticism according to the conventions of the communities that produced them, and they are more or less useful in talking about and coping with the phenomena we call "schoolteaching." As it happens, there is considerable precedent both for the broad topical structure that I construed as the fourfold problem and for the arguments I chose to play it out. But precedent is not necessity.

Then the critic might say, can I not survey the various arguments that I might include, select a set of arguments, and defend that set as being more resistant to criticism and more useful than

other sets that I might have chosen? If I adopt as a screen a set of literature reviews by specialists, some arguments will be ruled out of consideration, but every field that I consult will still contain a range of different arguments that are both treated with respect by the communities that produced them and relevant to the beginning of the year in introductory biology. The family of reasonable analyses like mine remains large.

Alternative Procedures. Still, the critic might argue, even if I cannot establish that some arguments are sounder and more useful in general, surely I can establish ways to decide, in advance of the analysis, that some arguments are more useful than others for my immediate purpose of interpreting a schoolteaching problem eclectically and deliberating on possible courses of action for dealing with that problem.

For example, two of the arguments included in this analysis rendered programs that tended to dominate the concluding deliberation; probably, that domination limited the exploration and application of the remaining arguments. A discussion of several arguments, all of which are worked out in programmatic implications, could both make it easier to see the respective contributions of the arguments for the programs and bring more programmatic resources to bear on the teaching problem.

Another suggestion was that the combination of similar arguments from Dewey and from Anderson and Roth is attractive because it tends to show development over time. That treatment also would tend to show precedents for the use of an argument. A related suggestion was that I might have presented opposed arguments rather than similar arguments on the same topics. That arrangement also could have been interesting and useful, as it would have called attention both to important disputes within a field and to the opposed arguments' different implications for action.

A Choice of Purposes and Risks. I did not dispute those suggestions, but did make some responses. To limit the analysis to arguments that already are highly developed would be to abandon the opportunity to discover how promising arguments might be developed most fruitfully.

Within an analysis of the same length, space spent developing the history and precedents of a particular argument is gained at the cost of ignoring other, different arguments that may serve to show, and to some extent remedy, the first argument's partiality of view. Similarly, presenting opposed arguments on the same topics reduces the range of concerns that an analysis of a given length can address. In both cases, there is a trade-off between the depth of treatment of an argument or debate and the range of topics and arguments that can be brought into relation with the schoolteaching problem.

The matter can be put as choice between two risks. The critic who calls for more extended treatment of fewer arguments is mindful of the risk of superficiality and misunderstanding. But there is another risk that arises precisely from deep and narrow engagement with an argument or field, in relative isolation both from a range of other arguments and from the schoolteaching problems to which they all presumably apply. It is the risk that Dewey called "hypostatizing" a theory to the point of "illusion." I sought a form of study that reduces this second kind of risk by bringing a range of different arguments into relation with the same schoolteaching problem. I accept that the effort entails an elevation of the first kind of risk.

In sum, I see no overriding considerations concerning the soundness and general or specific utility of arguments that would not leave me a choice among a large set of reasonable combinations of reasonable arguments. Beginning the year in introductory biology is a complex problem; a variety of arguments apply. The justifications for particular arguments are in those arguments; their inclusion may be attacked on that basis. Similarly, I see no reason now to limit this eclectic form of analysis to presenting only similar arguments, or opposed arguments, or programmatically developed arguments. Like other genres, this one might be employed in a range of variations for different purposes and circumstances. I am not fully confident about the preceding responses. As things stand, though, I think that the absence of decisive or authoritative bases for choosing arguments to work with is not a peculiar feature of my analysis.

Faithfulness to the Arguments. By reporting each argument that it employs, the analysis sets up the opportunity for anyone who is familiar with an argument and with the academic conventions that apply to it to show that and how I have misrepresented it; misunderstood its essential features, details, or implications; misapplied it to the problem, and so on. Beyond objections to the use of individual arguments, there may be objections to my use of them together. By selecting a set of arguments, reporting them, and confining attention to them throughout, my analysis provides opportunities for readers to become acquainted with all the arguments that are used, and so to participate more fully in the subsequent deliberations on programs for addressing the problem. That is, the form enables readers to equip themselves to object to connections I have made among the arguments or between arguments and the problem.

Almost certainly, a collection of specialists brought to a similar deliberation on the same schoolteaching problem would represent and apply their respective arguments more skillfully, interestingly, and usefully--and with better judgement--than I have. Indeed, I understood Schwab to be proposing that such eclectic deliberations on particular educational problems should be a more common form of work in educational studies than they are and, by implication, should be more common in educational literature than they are. One of my intentions in this project was to produce an example of such deliberation, so that Schwab's proposal could again be discussed. If the form indeed is promising, but is best practiced by collections of specialists, then I am content--if the specialists do so. If they do not, then I might have to make do in order to address educational problems that concern me.

Practical Objections. Connecting all the arguments to the same schoolteaching problem and comparing programs of activity for dealing with that problem creates opportunities for schoolteachers to attack the analysis on the basis of their practical knowledge of schoolteaching. My examiners filled in for the teachers. They criticized both the plausibility of the analysis for the problem to which it was addressed and the potential utility of the text to any teacher who faces that

problem. I found the point about the utility of the text easiest to counter, by showing that the problem is not peculiar to my analysis, but is a general problem for educational studies. I found counterarguments to the concern that the analysis is not plausible for the beginning of the year, but was not as satisfied with them.

In my view, the claim that the analysis is implausible for the beginning of the year is the most serious attack, because it suggests that I failed to understand the schoolteaching problem. If I have not countered that criticism, then my analysis came up short. It was impeachable, both by stubborn sensation and by the considered opinions of my fellow inquirers. That the analysis was impeachable, albeit by a complex judgement, is another sign that it might be disciplined.

Aims and Results

Even granting that the analysis has a distinct and describable form, and that it is amenable to discipline by criticism and refinement, and that it did not completely misunderstand the schoolteaching problem, what good is it? I will attempt to respond by reference to my original aims.

Integrate Practice. The analysis should thwart or rectify a tendency to overwork abstractions in isolation both from each other and from practical situations and so to disintegrate schoolteaching practice. I concluded that this instance of design-as-inquiry does so, partly by starting with a schoolteaching problem, partly by framing that fourfold problem in a way that treats it as a complex whole, and partly by employing a balanced collection of diverse arguments about it.

Pursuing associations among the arguments tends to bring back into view the connections that were smoothed away when the separate arguments were constructed and refined. Placing each argument in the context of the others tends to diminish its psychological independence from the practice to which it refers, and thus makes it more difficult to assign it a status that it cannot achieve. To some extent, the set of arguments helps to remedy any one argument's partiality.

Including moral arguments in the set helped to reconnect, if not reconcile, schoolteaching's moral aspect with its other important features.

Test Arguments. The analysis should provide a modest test of the separate arguments' pragmatic value, that is, their contribution to attaining working harmony among diverse educational desires in a schoolteaching situation. For the purpose of inquiry, pragmatic value is taken as an estimate of understanding. In this analysis, the selection and discussion of programs was dominated by the two arguments that are themselves complex, theoretically developed, empirically grounded, and programmatically elaborated by work in the field with schoolteachers. Put another way, they are already results of some eclectic deliberation. Presumably, persons who already prize that combination of qualities in an educational argument will not be surprised by the result.

Add Interpretive Value. At the same time, it became clear that none of the arguments taken alone is nearly adequate to decide how best to begin the year in a given introductory biology class. The analysis should add value to the separate arguments that it incorporates by bringing them together so that they can, to some extent, remedy each other's partiality. It appears that the analysis does add such value. For example, Elizabeth Cohen's arguments about Designing Groupwork reflect a commitment to justice, but do not provide an explicit argument for justice or for the schoolteacher's obligation to pursue it. Combining arguments drawn from Designing Groupwork with arguments from Rawls's (1971) theory of justice helps to raise the issue of justice more squarely, and so adds significance to decisions made about groupwork and other structures of participation. Relating both arguments to a schoolteaching problem was a useful way to develop associations between them, and so to add to their respective interpretive value. Considering this result, I speculate that eclectic deliberations on schoolteaching problems of mutual interest might help a group of scholars from different disciplines to attain greater parsimony and comprehension--without stretching their respective analyses beyond their frames and without accepting any burdensome or unrealistic implication that they must try to batter out a synthesis.

Provide Understanding. The analysis should provide a complex understanding, particular to the schoolteaching problem, that would complement the specialized on which it draws. I took a pragmatic position from Dewey, that the construction of elegant, general, and refutable abstractions is not the end of inquiry, but more nearly the middle. That position gives full credit to abstractive knowledge, but also suggests that there is another valuable kind of understanding, which is embedded, complex, particular, and serviceable for attaining a working harmony among our diverse desires in a given situation. There is a provocative tension between the two kinds of understanding, but they are not contestants.

I concluded that my analysis was a reasonably plain and orderly, albeit densely packed, inquiry into a substantial problem of schoolteaching. It appears to contain the complex sort of understanding that I sought. I now think that I should not be concerned that my analysis does not yield any of the concrete or abstract conclusions that I considered earlier. Perhaps the problem here is not that the analysis provides no conclusion, but that the sort of understanding that it does provide is difficult to pack up and carry away from the encounter with the text. My tentative appraisal is that eclectic deliberation on a schoolteaching problem is worth pursuing, both as a form of inquiry and as a way to organize educational theory and research for use in teacher education.

References for the Dissertation

Anderson, C. W. (1987). Three perspectives on cognition and their implications for science teaching. A paper presented at the Annual Meeting of the American Educational Research Association, Washington, DC.

Anderson, C. W. (1989). Policy implications of research on science teaching and teachers' knowledge. A paper presented the National Center for Research on Teacher Education Educational Policy Seminar, Washington, DC. (February).

Anderson, C. W. and Roth, K. J. (1988). Teaching for meaningful and self-regulated learning of science. Manuscript. To appear in J. Brophy (Ed.), Advances in research on teaching, V. 1, Teaching for meaningful understanding and self-regulated learning.

Beck, C., Glavis, G., Glover, S. A., Jenkins, M. B., Nardi, R. A. (1978). The rights of children: A trust model. Fordham Law Review, 46(4), 669-780.

Berger, J. J. and Zelditch, M., Jr. (1985). Status, rewards, and influence: How expectations organize behavior. San Francisco, CA: Jossey-Bass.

Berger, J. J., Rosenholtz, S. J. and Zelditch, M., Jr. (1980). Status organizing processes. Annual Review of Sociology 6, pp. 479-508.

Bird, T. (1987a). Taking the initiative: How proponents of secular public schools might address religious demands. Unpublished manuscript.

Bird, T. (1987b). Teacher assessment and professionalization. Paper prepared for the Carnegie Forum on Education and the Economy. June.

Boyer, E. (1983). High school: A report on secondary education in America. New York, NY: Harper and Row.

Brown, P. G. (1982). Human independence and parental proxy consent. In W. Gaylin and R. Macklin (Eds.), Who speaks for the child (pp. 209-222). New York: Plenum Press.

Callan, Eamonn. (1985) Indoctrination and Parental Rights. In Philosophy of Education Society Proceedings, 1985.

Clark and Peterson (1986). Teachers' thought processes. In M. C. Wittrock (Ed.), Handbook of research on teaching, third edition (pp. 255-296). New York: McMillan Publishing Company.

Clifford, G. J. and Guthrie, J. W. (1988). Ed School. Chicago : University of Chicago Press

Cohen, E. G. (1986a). Designing groupwork. New York: Teachers College Press.

Cohen, E. G. (1986b). On the sociology of the classroom. In J. Hannaway and M. E. Lockheed (Eds.), The contributions of the social sciences to educational policy and practice: 1965-1985 (pp. 126-162). Berkeley, CA: McCutchan.

Cuban, L. (1984). How teachers taught: Constancy and change in American classrooms 1890-1980. New York, NY: Longman.

Dewey, J. (1909/1936). Moral principles in education. Carbondale, Il: Southern Illinois University Press.

Dewey, J. (1929/1988). The Quest for Certainty.

Dewey, J. (1938). Experience and education. New York: Macmillan.

Dewey, J. (1904/1964). The relation of theory to practice in education. In Reginald D. Archambault (Ed), pp. 313-338), John Dewey on education: Selected writings. Chicago, IL: The University of Chicago Press.

Doyle, W. (1990). Classroom Knowledge as a Foundation for Teaching. Teachers College Record, 91(3), 347-360.

Doyle, W. (1986). Classroom organization and management. In M. C. Wittrock (Ed.), Handbook of research on teaching, third edition, pp. 392-431. New York: MacMillan Publishing Company.

Doyle, W., and Carter, K. (1987). Choosing the means of instruction. In Virginia Richardson-Koehler (Ed.), Educators' handbook: A research perspective, (pp. 188-206). New York: Longman

Elliott, D. S. , Huizinga, D., and Ageton, S.S. (1985). Explaining delinquency and drug use. Beverly Hills, CA: Sage Publications.

Emmer, E. T., Evertson, C.M. & Anderson, L.M. (1980). Effective cla -oom management at the beginning of the school year. Elementary School Journal 80, 219-231.

Feinberg, W. and Soltis, J. F. (1985). School and society. New York, NY: Teachers College Press.

Fenstermacher, G. D. (1978). A philosophical consideration of recent research on teacher effectiveness. In L. S. Shulman (Ed.), Review of Research in Education, 6 (pp. 157-185). Itasca, IL: F.E. Peacock.

Fenstermacher, G. D. (1986). Philosophy of research on teaching: Three aspects. In M. C. Wittrock (Ed.), Handbook of research on teaching, third edition (pp. 37-49). New York: McMillan Publishing Company.

Fenstermacher, G. D. and Soltis, J. F. (1986). Approaches to teaching. New York, NY: Teachers College Press.

Geertz, Clifford. Blurred genres: The refiguration of social thought. Chapter 1 of Local knowledge: Further essays in interpretive anthropology. New York, NY: Basic Books.

Goodlad, J. I. (1984). A place called school: Prospects for the future. New York, NY: MacGraw-Hill.

Hallinan, M. (1983). Summary and Implications. In P. Peterson and L. C. Wilkinson (Eds). The Social Context of Instruction: Group Organization and Group Processes. New York: Academic Press.

Hawkins, J. D., and Weis, J. G. (1985). The social development model: An integrated approach to delinquency prevention. Journal of primary prevention 6, pp. 73-97.

Hawkins, J. D., Doueck, H. J., and Lishner, D. M. (1988). Changing teaching practices in mainstream classes to improve bonding and behavior of low achievers. American Educational Research Journal 25 (1), pp. 31-50.

Hirschi, T. (1969). Causes of delinquency. Berkeley: University of California Press.

Holmes Group (1986). Tomorrow's teachers. Available from The Holmes Group, Inc., 501 Erickson Hall, East Lansing, MI 48824-1034.

Hurd, P. (1988). The modernization of education in biology: A new commitment to students. An address to the National Association of Biology Teachers, Chicago.

Jackson, J. (1966). A conceptual and measurement model for norms and roles. Pacific Sociological Review, 9, pp. 35-47.

Jackson, P. W.(1988). Facing our ignorance. Teachers College Record 88(3), pp. 384-389.

Martin, M. (1985). Concepts of science education: A philosophical analysis. Lanham, MD: University Press of America.

Noddings, Nel (1984). Caring: A feminine approach to ethics and moral education. Berkeley : University of California Press.

Phillips, D. C. and Soltis, J. F. (1985). Perspectives on learning. New York, NY: Teachers College Press.

Rawls, John (1971). A theory of justice. Cambridge, MA: Belknap Press of Harvard University Press.

Richardson-Koehler, V. (Ed.) (1987). Educators' handbook: A research perspective. New York: Longman

Rorty, R. (1982). Consequences of Pragmatism. University of Minnesota Press.

Rorty, R. (1979). Philosophy and the mirror of nature. Princeton, NJ: Princeton University Press.

Rosenholtz, S. J. (1985). Effective schools: Interpreting the evidence. American Journal of Education (May).

Rosenholtz and Simpson, 1984. Classroom organization and student stratification. Elementary School Journal 85(1).

Rosenholtz and Wilson (1980). The effect of classroom structure on shared perceptions of ability. American Educational Research Journal 17(1), pp. 75-82.

Scheffler, I. (1968). The concept of teaching. In C. J. B. MacMillan and T.W. Nelson (Eds.), Concepts of teaching: Philosophical essays. Chicago, IL: Rand McNally and Company.

Schwab, J. J. (Supervisor). (1963). Biology Teachers' Handbook. New York: John Wiley and Sons, Inc.

Schwab, J. J. (1962). The concept of the structure of a discipline. Educational Record, 43, 197-205.

Schwab, J. J. (1978a). The practical: A language for curriculum. In I. Westbury and N. J. Wilkof (Eds.), Science, curriculum, and liberal education: Selected essays, pp. 287-321. Chicago, IL: The University of Chicago Press.

Schwab, J. J. (1978b). The practical: Arts of eclectic. In Ian Westbury and Neil J. Wilkof (Eds.) Science, curriculum, and liberal education (pp. 322-364). Chicago, IL: The University of Chicago Press.

Schwab, J. J. (1978b). The practical: Translation into curriculum. In Ian Westbury and Neil J. Wilkof (Eds.) Science, curriculum, and liberal education (pp. 365-383). Chicago, IL: The University of Chicago Press.

Sharan, S. (1980). Cooperative learning in small Groups: Recent methods and effects on achievement, attitudes, and ethnic Relations. Review of Educational Research, 50, 241-271.

Sharan, S. & Shachar, H. (1988). Language and learning in the cooperative classroom. New York: Springer-Verlag.

Shulman, L. S. (1986). Paradigms and research programs in the study of teaching. In M. C. Wittrock (Ed.), Handbook of research on teaching, third edition. New York, NY: MacMillan.

Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. Harvard Educational Review 57(1), pp. 1-22. (February).

Sizer, T. R. (1985). Horace's compromise: The dilemma of the American high school. Boston, MA: Houghton Mifflin

Slavin, R. (1981). A policy choice: cooperative or competitive learning. Character, 2(3), 1-5.

Slavin, R. (1983). Cooperative learning. New York, NY: Longman.

Strike, K. A. and Soltis, J. F. (1985). The ethics of teaching. New York, NY: Teachers College Press.

Towle, A. (1989). Modern biology. Austin, TX: Holt, Rinehart and Winston.

Walker, D. F. and Soltis, J. F. (1986). Curriculum and aims. New York, NY: Teachers College Press.

Webb, N. (1982). Student Interaction and Learning in Small Groups. Review of Educational Research, 52, 421-445.

Wittrock, M. C. (Ed.) (1986). Handbook of research on teaching, third edition. New, York, NY: MacMillan Publishing Company.

White, R. T. and Tisher, R. P. (1986). Research on natural sciences. In M. C. Wittrock (Ed.), Handbook of research on teaching, third edition (pp. 874-905). New York: McMillan Publishing Company.

END

U.S. Dept. of Education

Office of Education
Research and
Improvement (OERI)

ERIC

Date Filmed

March 29, 1991